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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,566	03/01/2002	Masahiro Furo	134.142	3943

7590 11/01/2004

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EXAMINER	
XU, LING X	

ART UNIT	PAPER NUMBER
1775	

DATE MAILED: 11/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/087,566	FURO ET AL.	
	Examiner	Art Unit	
	Ling X. Xu	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *25-72* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *25-72* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/22/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/22/2004 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 25 and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by Copetti et al. (US 2001/0017770).

Copetti discloses a module comprises a first conducting layer on an insulating substrate (Page 1, [0008]). The conducting layer consisting mainly of Al doped with a few percents of Si (page 1, [0022] and Page 4, [0075]).

Copetti also discloses the insulating substrate is made of alumina (page 1, [0018]).

Since Copetti discloses the module comprises the same structure as claimed, the same structure will inherently have the same properties as claimed such as having the Vickers hardness of not less than 25 and not more than 40.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 25-28, 30-32 and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ning et al. (US 5,965,193) in view of in view of Boutin et al (US 4,222,774).

Ning discloses an electronic circuit substrate made of an aluminum ceramic composite material wherein an electronic circuit is formed on an aluminum surface of the aluminum-ceramic composite material. The aluminum-ceramic composite material is made by directly solidifying an aluminum alloy on at least a portion of a ceramic substrate.

Ning does not disclose the metal layer comprises small amount of Si, Mn, and/or Mg.

With respect to claims 26-28, 31-32, and 35, Boutin teaches an aluminum alloy for use in the production of the articles subjected to elevated temperature comprises 1.0-1.5% of Si, less than 0.2% of Mg and 0.9-1.5% of Mn, Ni of more than 0.05% and Ni+ Fe+ Co is 0.8-2% (Abstract).

Boutin also teaches that the aluminum alloys has improved mechanical characteristics during and after the aluminum alloys exposure to elevated temperature (Col. 1, lines 1-25).

Therefore, it would have been obvious to one of ordinary skill in the art to use the aluminum alloy as taught by Bountin in Ning's aluminum layer in order to improved mechanical characteristics during and after the aluminum layer exposure to elevated temperature when the power module has large amount of heat build up during the operation process.

Since Ning and Boutin disclose the module comprises the same metal alloy layer as claimed, the same metal alloy layer would have the same properties as claimed such as having the Vickers hardness of not less than 25 and not more than 40.

4. Claims 29 and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ning and Boutin, as applied to claims 25-28, 30-32 and 35-36 above, and further in view of Auran et al. (US 6,153,025).

As stated above, Ning and Boutin disclose the insulating surface board as claimed.

Ning and Boutin do not disclose the aluminum alloy includes Cu and Zinc as recited in claims 29 and 33-34.

Auran teaches the aluminum based alloy comprising controlled amount of copper (up to 0.50%), zinc (up to 0.70%), silicon, and manganese has superior corrosion-resistant and high tensile strength (abstract and col. 1, lines 50-55).

Therefore, it would have been obvious to one of ordinary skill in the art to add a small amount of copper and zinc to aluminum based alloy in order to obtain aluminum alloy with high corrosion-resistant and tensile strength, as taught by Auran.

5. Claims 49-52, 54-56 and 59-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiyoshi et al. (US 6,297,549) in view of Ning et al and Boutin et al.

Hiyoshi discloses a semiconductor power module comprises a ceramic substrate, a metallic plate such as copper plate directly bonded to surface of the substrate and a copper plate is bonded to the bottom surface of the substrate (col. 1, lines 35-55).

Hiyoshi does not disclose the use of aluminum alloy as the metallic plate.

Ning discloses an electronic circuit substrate made of an aluminum ceramic composite material wherein an electronic circuit is formed on an aluminum surface of the aluminum-ceramic composite material. The aluminum-ceramic composite material is made by directly solidifying an aluminum alloy on at least a portion of a ceramic substrate.

Ning also discloses that the electronic circuit substrate is suitable for power modules (col. 1, lines 20-30).

Ning further discloses that aluminum alloy as metallic plate has better joint strength, thermal conductivity and heat resistance characteristics than copper (col. 5, lines 55-67 and col. 6, lines 15-30),

Therefore, it would have been obvious to one of ordinary skill in the art to use aluminum alloy as metallic plate because aluminum alloy as metallic plate has better joint strength, thermal conductivity and heat resistance characteristics, as taught by Ning.

Hiyoshi and Ning do not disclose the metal layer comprising small amount of Si, Mn, and/or Mg.

With respect to claims 50-52, 55-56, and 59, Boutin teaches an aluminum alloy for use in the production of the articles subjected to elevated temperature comprises 1.0-1.5% of Si, less than 0.2% of Mg and 0.9-1.5% of Mn, Ni of more than 0.05% and Ni+ Fe+ Co is 0.8-2% (Abstract).

Boutin also teaches that the aluminum alloys has improved mechanical characteristics during and after the aluminum alloys exposure to elevated temperature (Col. 1, lines 1-25).

Therefore, it would have been obvious to one of ordinary skill in the art to use the aluminum alloy as taught by Bountin in Hiyoshi and Ning's aluminum layer in order to improved mechanical characteristics during and after the aluminum layer exposure to elevated temperature when the power module has large amount of heat build up during the operation process.

Since Hiyoshi, Ning and Boutin disclose the module comprises the same metal alloy layer as claimed, the same metal alloy layer would have the same properties as claimed such as having the Vickers hardness of not less than 25 and not more than 40.

6. Claims 53 and 57-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiyoshi, Ning and Boutin, as applied to claims 49-52, 54-56 and 59-60 above, and further in view of Auran et al. (US 6,153,025).

As stated above, Hiyoshi, Ning and Boutin disclose the insulating surface board and the power module as claimed.

Hiyoshi, Ning and Boutin do not disclose the aluminum alloy includes Cu and Zinc.

Auran teaches the aluminum based alloy comprising controlled amount of copper (up to 0.50%), zinc (up to 0.70%), silicon, and manganese has superior corrosion-resistant and high tensile strength (abstract and col. 1, lines 50-55).

Therefore, it would have been obvious to one of ordinary skill in the art to add a small amount of copper and zinc to aluminum based alloy in order to obtain aluminum alloy with high corrosion-resistant and tensile strength, as taught by Auran.

7. Claims 37-40, 42-44, 47-48, 61-68 and 71-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirose et al. (US 6,122,170) in view of Boutin et al (US 4,222,774).

With respect to claims 37, Hirose discloses a power module board comprise an insulting substrate board comprises a ceramic substrate and a metal layer consisting mainly of aluminum bonded on both surfaces of the ceramic substrate board through an intervene layer (Col. 4, lines 15-20). The intervene layer may be functioned as a brazing layer (col. 8, lines 55-67).

With respect to claims 42 and 66, Hirose discloses the ceramic substrate board is aluminum nitride or silicon nitride (Col. 4, lines 13-20).

With respect to claim 61, Hirose discloses a power module board comprises a semiconductor chip, IGBT chip or the like, fixed onto at least one surface of the ceramic base plate with a conductive layer made of Al (Col. 9, lines 5-15) interposed therebetween and another metal layer also made of Al (Col. 9, lines 5-15) formed onto other surface of the ceramic base plate (Abstract). The conductive layer and the metal layer disclosed by Hirose are considered functionally equivalent to the claimed metal layers.

Hirose further discloses a metal film (the same as the claimed "metal base plate") is provided entirely on the rear surface of the ceramic base plate (Col. 9, lines 15-25).

Hirose does not disclose the metal layer comprises small amount of Si, Mn, and/or Mg.

With respect to claims 38-40, 43-44, 47, 62-64, 67-68 and 71, Boutin teaches an aluminum alloy for use in the production of the articles subjected to elevated temperature comprises 1.0-1.5% of Si, less than 0.2% of Mg and 0.9-1.5% of Mn, Ni of more than 0.05% and Ni+ Fe+ Co is 0.8-2% (Abstract).

Boutin also teaches that the aluminum alloys has improved mechanical characteristics during and after the aluminum alloys exposure to elevated temperature (Col. 1, lines 1-25).

Therefore, it would have been obvious to one of ordinary skill in the art to use the aluminum alloy as taught by Bountin in Hirose's aluminum layer in order to improved mechanical characteristics during and after the aluminum layer exposure to elevated temperature when the power module has large amount of heat build up during the operation process.

Since Hirose and Boutin disclose the module comprises the same metal alloy layer as claimed, the same metal alloy layer would have the same properties as claimed such as having the Vickers hardness of not less than 25 and not more than 40.

8. Claims 41, 45-46, 65 and 69-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirose and Boutin, as applied to claims 37-40, 42-44, 47-48, 61-68 and 71-72 above, and further in view of Auran et al. (US 6,153,025).

As stated above, Hirose and Boutin disclose the insulating surface board and the power module as claimed.

Hirose and Boutin do not disclose the aluminum alloy includes Cu and Zinc.

Auran teaches the aluminum based alloy comprising controlled amount of copper (up to 0.50%), zinc (up to 0.70%), silicon, and manganese has superior corrosion-resistant and high tensile strength (abstract and col. 1, lines 50-55).

Therefore, it would have been obvious to one of ordinary skill in the art to add a small amount of copper and zinc to aluminum based alloy in order to obtain aluminum alloy with high corrosion-resistant and tensile strength, as taught by Auran.

Response to Arguments

9. Applicant's arguments filed 9/20/2004 have been fully considered but they are not persuasive.

Applicant argues that Copetti does not teach the claimed invention because Copetti, as shown in every figure, teaches a barrier layer provided between the substrate and the first structured electrically conducting layer and each embodiment teaches providing a structured barrier layer on a substrate. The Examiner disagrees.

Copetti discloses a barrier layer may be provided on the substrate. The barrier layer is an optional layer. Copetti discloses that the first electrically conducting layer is deposited on the barrier layer or alternatively on the substrate 1 (page 3, paragraph [0063]). Accordingly, Copetti teaches that the first electrically conducting layer can be deposited directly on the dielectric substrate.

A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. *Merck & Co. v.Biocraft*

Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also *Celeritas Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir.1998)." *See* MPEP 2123.

Applicant's arguments with respect to claims rejections under 35USC 103(a) based on Hirose et al. (US 6,122,170) in view of Bouin et al (4,222,774) are moot in view of the new ground(s) of rejection.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ling X. Xu whose telephone number is 571-272-1546. The examiner can normally be reached on 8:00 - 4:30 Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah D. Jones can be reached on 571-272-1535. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ling X. Xu
Examiner
Art Unit 1775

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